



## Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

foot defectives among children of school age, but the figures and facts here presented as the result of this census show that they have undershot the mark by a wide margin. Most of the deviations from normal are of a character which will admit of correction and cure, if properly treated; whereas if neglected, they will tend to cripple and to impair the efficiency of those affected. Parents, school boards, and health boards should cooperate so that all growing children may be afforded opportunity to be similarly examined with a view to the discovery of any existing or threatening foot defects, in order that exercises and treatment may be prescribed that will tend to make them foot-sound.

---

## AN OCCUPATIONAL DERMATOCONIOSIS AMONG ZINC OXIDE WORKERS.

By JOHN A. TURNER, Passed Assistant Surgeon (R), United States Public Health Service.

The rapid advancement in industrial medicine during the past few years has brought a decided increase to our knowledge of the various types of occupational skin affections. As to the prevalence of skin affections in trades, Knowles says that "Almost one-sixth of all skin cases are due to the occupations of the individual. Practically every occupation and every irritant can produce an eczema."<sup>3</sup>

During a recent investigation, in a zinc oxide manufacturing plant, of the effects of inhaling zinc oxide dust, the writer's attention was directed to the frequent occurrence of a troublesome skin disease affecting the employees who are exposed to this dust. Available literature on this disease gives very meager information. Kober and Hanson<sup>4</sup> mention the existence of a dermatitis among oxide workers, but do not describe it.

The workers in the plant visited call the disease "oxide pox." No explanation was obtainable as to the origin of the name, but it is presumed that the similarity in appearance of the disease to the smallpox eruption might account for it.

### OCCURRENCE.

Of the 17 men examined, who are exposed to the oxide dust, 14 gave a history of having, or having had, attacks of "oxide pox." Of the 7 men employed in the bagroom department, 5 gave a positive and 2 a negative history; and of the 10 men working in the packing department, 9 gave a positive and 1 a negative history. Of the entire group, 8 were suffering from the affection at the time of investigation.

---

<sup>3</sup> R. Prosser White, citing Knowles, *Brit. Jour. Derm.*, 1913, Vol. XXV, p. 275 (Abst.).

<sup>4</sup> Kober and Hanson, *Diseases of Occupation and Vocational Hygiene* (1916), p. 503.

The following table shows the departments and the number of men in each occupational group who have and have not been affected by the dermatosis:

Department.	Occupation.	Positive.	Negative.
Bagroom department.....	Shakers.....	5	1
	Truckers.....	0	1
Packing department.....	Packers.....	6	1
	Tailors.....	2	0
	General repairmen.....	1	0
Total.....		14	3

As to the length of the time of employment of these men in the trade: 2 had worked less than 1 year; 3 from 1 to 4 years; and 12 had worked in the plant 10 years or over. It would seem, therefore, that the length of time of employment does not appear to play any part in the occurrence of the disease.

#### ETIOLOGY.

"Oxide pox" is primarily due to a clogging of the sebaceous glands with zinc oxide, and secondly to infection. The dermatosis is characterized by a papular-pustular eruption, which, in the cases observed, appeared in the pubic region, on the scrotum and inner surface of the thigh, and, occasionally, in the axilla and on the inner surfaces of the arms. The bodies and clothing of the men exposed are continuously covered with the oxide dust during the work period. Thus, wherever two surfaces of the body rub together, the oxide powder, the body debris, and bacteria normally present on the skin are rubbed into the glands. This action is greatly facilitated by free perspiration. The plugging of these skin glands produces an ideal incubator for the bacteria.

#### THE ERUPTION.

The eruption appears first as a small, red, projecting papule, 2 to 3 millimeters in diameter, with a white central plug. Upon palpation the papule has a hard, shotlike feeling, similar to that of the small-pox papule. There is an areola of inflammation surrounding the base of the papule. The skin between the papules may or may not be inflamed and swollen. On the second or third day of the disease, the central portion of the papule begins to soften and develops into a pustule. Usually the pustules are but slightly larger than the papules, but occasionally they become as large as a cherry. All the papules do not progress to the pustular stage; some dry up and disappear. Before the pustular stage occurs, the contents of the papules are very difficult to squeeze out. The contents are white in appearance and are composed chiefly of zinc oxide.

There is an intense itching, which in most instances causes the patient to scratch off the tops, or to squeeze out the contents. This action relieves the itching. In 10 of the cases the skin of the affected parts was dry, and in 4 cases it was moist, somewhat similar to weeping eczema. The damage resulting from the scratching aggravates the condition and prolongs the period of healing. The eruption usually persists for a week or 10 days, gradually subsiding and drying up. This condition is followed by a slow but marked exfoliation of the epidermis. In 13 of the cases the pubic region, scrotum, and inner surfaces of the thigh were affected. In 4 cases the axilla and inner surfaces of the arms were also involved.

The disease is most prevalent during the summer months and is augmented by free sweating. Six of the men examined claimed that they were affected regardless of the season, but that it was more troublesome during the summer months. No time from work was lost on account of the disease, although it caused considerable discomfort.

The symptoms that were observed were entirely of a local character; and this apparent absence of systemic disturbances was borne out by the histories obtained from the men themselves.

#### BACTERIOLOGY.

The bacteriological observations were made by Dr. H. P. Bachelor, chief surgeon of the Palmerton Hospital, and are as follows:

"The observations were made during the acute stage of the eruption. The smears show considerable numbers of pus cells, a few red blood cells, and mononuclear leucocytes. Only occasionally did we see cocci in the smears, but *Staphylococcus aureus* was demonstrated in over 90 per cent of the observations, the culture being made on blood agar slants. Every precaution was taken to avoid contamination of the overlying skin. The field was cleansed by the usual alcohol, ether, and tincture of iodine method. The pustules were opened with a sterilized knife. A platinum loop was inserted well into the base of the lesion.

"After the usual cleansing of the lesion and the surrounding area, the characteristic white appearance of the eruption was lost, leaving a small infected and infiltrated area. A microscopic section showed an area of central necrosis with infiltration of leucocytes about it. There was a slight infection of the neighboring vessels and an absence of giant cells."

#### PROCESS OF MANUFACTURE IN PLANT STUDIED.

Zinc oxide (ZnO) is made, in the plant investigated, by roasting in a furnace zinc ore or spelter mixed with fine anthracite coal. The fumes evolved are collected in a drum located above the furnace and thence conveyed by means of a pipe to the bag room. This pipe enters the bag room near the ceiling, where it branches into a number

of horizontal feed pipes. To these feed pipes are attached many long perpendicular muslin bags, spaced approximately 3 feet apart. These bags, approximately 30 to 40 feet long, extend to within 10 or 12 feet of the floor, and to the floor end of each is fastened a canvas collecting bag. Two occupational groups are employed in the bag room, namely, shakers and truckers. The shakers are required to go aloft several times daily to the various levels of the room in order to shake the muslin bags, and thus free the meshes of the muslin from the oxide, allowing the hot air and gases, if any be present, to escape. A considerable quantity of zinc oxide escapes through the meshes; therefore the atmosphere of the room constantly contains considerable quantities of the dust. The truckers remove the filled canvas bags and convey them by trucks to the packing department. The men work 9 hours per day in the bag room department. They wear ordinary work clothing and take no precautions whatever to protect themselves from the dust.

In the packing department there are three occupational groups, namely, packers, tailors, and repairmen. The packers place the oxide in a large bolter, where it is screened and then packed into paper bags and made ready for storage or shipment; the tailors are employed to make new muslin and canvas bags and to repair the old ones; and the repairmen are employed to repair all machinery in the bag and packing departments. All these employees are exposed to large quantities of oxide dust for 9 hours per day, their clothes and bodies being covered with it.

#### PROPERTIES OF ZINC OXIDE.

The United States Dispensatory<sup>5</sup> describes zinc oxide as "a very fine amorphous white or yellowish-white powder, free from gritty particles, without odor or taste. It gradually absorbs carbon dioxide from the air. It is insoluble in water or alcohol, but is soluble in dilute acids, ammonia water, and ammonia carbonate solution."

When freshly made, zinc oxide is very dry; samples taken from the collecting bags, upon analysis<sup>6</sup> showed an average moisture content of 0.1426 per cent as compared with 0.3165 per cent in the samples taken from the packing and storage rooms. Thus the moisture content of oxide that has been exposed to the air is increased 122 per cent.

A chemical analysis of zinc oxide shows that the total amount of adulterating substance is very small, being but 0.801 per cent. The table following shows the kind and percentage of adulterants:

---

<sup>5</sup> The Dispensatory of the United States, edition of 1910, p. 1211.

<sup>6</sup> Analysis made by the New Jersey Zinc Co., Palmerton, Pa.

*Analysis of zinc oxide.*<sup>7</sup>

	Per cent.
Insoluble substances.....	0.026
Water (H <sub>2</sub> O) at 110° C.....	.244
Carbon dioxide (CO <sub>2</sub> ).....	.035
Total sulphur (S) as (SO <sub>2</sub> ).....	.240
Chlorine (Cl).....	.036
Lead oxide (PbO).....	.96
Cadmium oxide (CdO).....	.23
Bismuth trioxide (Bi <sub>2</sub> O <sub>3</sub> ).....	Absent.
Copper oxide (CuO).....	Absent.
Iron (Fe <sub>2</sub> O <sub>3</sub> ).....	.017
Manganese oxide (MnO).....	.005
Arsenic (As <sub>2</sub> O <sub>3</sub> ).....	.53
Antimony (Sb <sub>2</sub> O <sub>3</sub> ).....	.022
Zinc oxide (ZnO).....	99.199

According to the United States Dispensatory, "zinc oxide is used as an antispasmodic in chorea, epilepsy, and in whooping cough. It is probably of little value as a systemic remedy. It is sometimes employed for its astringent and its sedative properties in diarrhea. It is nontoxic, protective, mildly astringent, and probably antiseptic."

The most common present day medical use to which the oxide is put, is in the form of salves and pastes. Industrially it is used in the manufacture of paint.

## CONCLUSIONS.

The following conclusions are drawn from this study:

1. Zinc oxide is considered a nontoxic substance, and from the chemical analysis it is evident that the adulterating substances are in insufficient amount to be harmful. It is a nonpoisonous material, but is capable of acting as a mechanical conveyor of bacteria.

2. The workers in the bag room and packing departments are exposed during the work period to considerable amounts of zinc oxide dust, which covers the body and clothing, and no precautions are taken by the workers to protect themselves.

3. The zinc oxide, body débris, and bacteria are forced into the sebaceous glands, distending them. This action is aided by free perspiration, and the rubbing together of two body surfaces. It is probable that the presence of the foreign substances, acting as a mechanical block to the outlet of the glands, and the increased tension due to the retained secretion, produce sufficient irritation of the gland walls to allow an invasion of the bacteria and a resulting infection.

4. The disease occurs most frequently during the summer months, and to a lesser degree during the winter months. The consensus of opinion among the workmen is that the occurrence of the disease depends entirely upon personal cleanliness, and that if they take daily baths no trouble is experienced.

<sup>7</sup> Analysis made by the New Jersey Zinc Co., Palmerton, Pa.

## RECOMMENDATIONS.

1. Special work clothes of a close weave of cloth, made to fit snugly at neck band, wristband, and ankles, should be worn in order to prevent the dust from coming in contact with the body.

2. The work clothes should be frequently cleaned.

3. Old muslin and collecting bags that are to be repaired should first be thoroughly cleaned.

4. Suitable washing, bathing, and change-room facilities should be provided so that the workers can bathe at the close of the work day.

5. Lack of attention to personal hygiene is a prime factor in the causes of this disease, and the workmen should be instructed in this respect.

6. The workmen should be advised to report immediately the presence of the disease as soon as it is detected.

## RESOLUTION OF BOARD OF HEALTH UPHELD.

The United States Circuit Court of Appeals, Fourth Circuit, has upheld <sup>8</sup> the action of a county board of health in North Carolina in prohibiting circuses and carnivals in a county during a certain period to prevent the spread of communicable diseases. The resolution of the board of health stated that the county was just recovering from a serious epidemic and that communicable diseases were prevalent elsewhere. The owner of a traveling show brought suit when a license was refused him, but the court sustained the action of the board of health. The following is quoted from the opinion:

Nothing is better settled than that in the consideration of ordinances and laws of the character in question here, every intendment is to be made in favor of the lawfulness of the exercise of municipal power, making regulations to promote the public health and safety. (*Dobbins v. Los Angeles*, 195 U. S. 223, 225, 25 Supp. Ct. 18, 49 L. Ed. 169.) It is not for the courts, in the administration of justice, to substitute their judgment for that of the legislative or municipal authority or to interfere with the lawful exercise of the power and authority granted in furtherance of the ends desired, unless those acting have plainly and manifestly exceeded their power and authority to the prejudice of those affected. This is strikingly true in considering rules and regulations coming clearly within the domain and discretion of public health authorities. \* \* \*

## DEATHS DURING WEEK ENDED OCT. 22, 1921.

*Summary of information received by telegraph from industrial insurance companies for week ended Oct. 22, 1921, and corresponding week, 1920. (From the Weekly Health Index, Oct. 25, 1921, issued by the Bureau of the Census, Department of Commerce.)*

	Week ended Oct. 22, 1921.	Corresponding week, 1920.
Policies in force.....	47, 682, 144	44, 825, 321
Number of death claims.....	8, 302	6, 677
Death claims per 1,000 policies in force.....	9.1	7.8

<sup>8</sup> *Benson v. Walker et al.*, 274 Fed. 622.